ordinary luminous phenomena—whilst the other is exhausted to about the millionth of an atmosphere. I will first connect the moderately exhausted bulb with the induction-coil, and, retaining the pole at one side (*a*) always negative, I will put the positive wire successively to the other three poles with which the bulb is furnished. You will see that as I change the position of the positive pole, the line of violet light joining the two poles changes. In this moderately exhausted bulb, therefore, the electric current always chooses the shortest path between the two poles, and moves about the bulb as I alter the position of the wires.

This, then, is the kind of phenomenon we get in ordinary exhaustions. I will now try the same experiment with a tube that is highly exhausted, and, as before, will make the side pole (*a'*) the negative, the top pole (*b*) being positive. Notice how widely different is the appearance from that shown by the last bulb. The negative pole is in the form of a shallow cup. The bundle of rays from the cup crosses in the centre of the bulb, and thence diverging, falls on the opposite side as a circular patch of green light. As I turn the bulb round you will all be able to see the faint blue focus and the green patch on the glass. Now observe, I remove the positive wire from the top, and connect it with the side pole (*c*). The green patch from the divergent negative focus is still there. I now make the lowest pole (*d*) positive, and the green patch still remains where it was at first, unchanged in position or intensity.

This, then, gives us another fact which brings us a little nearer to the cause of this green phosphorescence. It is this—that in the low vacuum the position of the positive pole is of every importance, whilst in a high vacuum it scarcely matters at all where the positive pole is; the phenomena seem to depend entirely on the negative pole. In very high vacua, such as we have been using, the phenomena follow altogether the negative pole. If the negative pole points in the direction of the positive, all very well, but if the negative pole is entirely in the opposite direction it does not matter; the line of rays is projected all the same in a straight line from the negative.

(*To be continued.*)

NOTES

THE following grants have just been made from the Research Fund of the Chemical Society:—30*l.* to Mr. W. Whitley Williams for experiments on an improved method of organic analysis; 25*l.* to Mr. M. M. Pattison Muir, of Caius College, Cambridge, for determining the physical constants and chemical habitudes of certain bismuth compounds; 15*l.* to Mr. J. M. Thomson for experiments on the action of isomorphous bodies in exciting the crystallisation of super-saturated solutions; 50*l.* to Dr. Wright for continuing his researches on chemical dynamics; 25*l.* to Mr. F. D. Brown for continuing his researches on the theory of fractional distillation; 30*l.* to Mr. Bolas for an investigation of certain chromium compounds; 20*l.* to Mr. F. R. Japp for an investigation of the action of organo-zinc compounds on quinones; and 100*l.* (the De la Rue donation) to Dr. H. E. Armstrong for the determination of certain physical properties, especially refractive indices, of typical chemical compounds. Dr. De la Rue has announced his intention of presenting the fund with another 100*l.* This will be the third donation of that amount which the fund has received from him.

THE Council of the Royal Society of Edinburgh have decided to award the Makdougall Brisbane Prize for the biennial period 1877–78 to Prof. Geikie for his "Memoir on the Old Red Sandstone of Western Europe," Part I., published in the Society's *Transactions*, and forming part of his valuable contributions to geology.

GENERAL MYER, of the U.S. Signal Corps, has arrived in Paris from Rome, on his way to London, where he will have an interview with the Meteorological Board for the purpose of establishing an understanding in matters of common interest, especially on the subject of exchanging telegrams with America, so that both nations may enjoy a daily summary of the weather on each continent.

M. LISSAJOUS has been elected a Foreign Corresponding Member in the Paris Academy, Section of Physics, in place of the late Dr. von Mayer.

DR. FAIVRE, the Dean of the Lyons Faculty of Sciences, has been run over by a cart when conducting a number of pupils to a botanical excursion. His constitution was so dreadfully shaken that he died after a few days of suffering. Dr. Faivre was opposed to the Darwinian theory, and has published books against the mutation of species. His most important publication was a review of Goethe's scientific works.

THE collection of living reptiles in the Jardin des Plantes, Paris, has just received an interesting addition in the shape of three living examples of the rare East-Indian serpent known to naturalists as *Acrochordus javanicus*. These snakes belong to quite a peculiar type of the Ophidian order, and are, in fact, truly fresh-water snakes, living among rocks wholly immersed beneath the surface, and but seldom rising up to inhale air. They are quite harmless, and allow themselves to be handled without difficulty. The food of the *Acrochordus* is supposed to be fruit—a most anomalous diet for a snake, if this is really the case, but the specimens at Paris have not yet shown a taste for eating anything.

WITH reference to a recent note, the Abbé Moigno writes us from Rome that he has not resigned the editorship of *Les Mondes*, which he has edited for twenty-seven years. He has gone to Rome to lay at the feet of the Pontiff the results of many years laborious work, but will return as he went, not a Cardinal, but the *doyen* of scientific journalists, eager for progress in all directions. We sincerely wish the Abbé many more years to carry on the work of editing his well-known journal, that has for so long done good service to science.

AMONG other recommendations made at the recent meeting of the International Meteorological Congress was the adoption of the meridian of Greenwich as the starting-point for the construction of synoptic weather charts. In the event of another meridian being used in the construction of meteorological charts the Congress recommended that the difference of longitude between the meridian employed and that of Greenwich should be stated on the chart.

A TERRIFIC thunderstorm broke over Paris on June 28 at six o'clock in the morning. There were a number of casualties; one of the most singular occurred in a room in the rue de Clichy, No. 34, where two old ladies live. One of them was drinking milk from a cup, which was knocked from her hands and could not be found, although the lady escaped unhurt. In the *rez-de-chaussée* was the shop of a chemist, where a number of bottles were broken, and in the same house a bed, where a woman had taken refuge, was cut into two equal parts.

IN a balloon ascent which took place at Rouen on June 15 last with a large balloon, the occupants of the car found at 12,000 metres from the earth a cloud where the cold was so intense that small icicles were seen suspended to the beards and moustaches of the travellers.

THE Parkes Museum of Hygiene, founded as a memorial of the late Dr. E. A. Parkes to promote the study of all matters bearing upon the health of the community or the individual, was formally opened on Saturday by the Home Secretary, in the rooms on the top floor of the building lent by the council of University College until separate and suitable premises can be obtained. At present there have been brought together apparatus, specimens, books, reports, and drawings illustrative of matters connected with engineering and local hygiene; architecture, including general designs and details of buildings, methods of constructing hospitals, blocks of artisans' dwellings, &c., with specimens of appliances for necessary sanitary arrangements, drainage, ventilation, and lighting; the furnishing of buildings, public and domestic, clothing, food; and the preservation of health and the relief of sickness. At present the collection is incomplete, but the committee hoped that funds and material would be forthcoming to make the Parkes Museum a national and a useful institution worthy of the important subject which it illustrated and the great name it bore. Prof. Huxley, who was present, expressed a hope that Mr. Cross would use his influence with the Government and with the House of Commons to stay a movement which appeared intended to dam back the stream of education and prevent the lower classes from gaining the knowledge they so much needed.

A MEETING of ladies and gentlemen interested in Japanese art, literature, folk-lore, &c., will be held to-morrow at the Royal Asiatic Society, 22, Albemarle Street. The meeting is called together for the purpose of establishing in London a central institution, with the following objects:—To bring into closer communication admirers and students of Japanese art, literature, &c.; and to collect, record, and disseminate information relative to Japan. To encourage residents in Japan, and the Japanese, to collect such material. To enlist the cordial co-operation of scientific and literary societies, and individuals, in extending the usefulness of the Institution. To publish proceedings, notes, queries, and other interesting matter; and to facilitate this branch of research and study. After the business is concluded, an "Old Resident" will communicate some interesting facts about Japan, illustrated by photos, &c., from his collection, and discussion will follow.

SOME attention has recently been drawn in the *Gardeners' Chronicle* to tea prepared in St. Michael, Azores, from plants grown in that island. It seems that two Chinese tea-growers have been sent for by the Agricultural Society of St. Michael, and after a careful examination of the tea-plantations they pronounced the plants as belonging to the very best varieties grown in China. It is prophesied that "the time is not far off when tea from St. Michael will come to the European market and prove to be of a very good quality." In a subsequent number of the *Gardeners' Chronicle*, however, Mr. Elwes points out the difficulties to be contended with in a competition with India and China in the production of tea, notably the price of land, the cost of labour, the temperature, extent of rainfall, &c. The first outcome of this tea growing in the Azores is shown in a sample recently received at the Kew Museum from Señor José de Canto. This sample is of good appearance through perhaps somewhat over roasted, the smell also is good, and the flavour of the infusion by no means to be despised.

THE new fodder grass *Euchlæna luxurians* known as the Teosinte, and which has attracted considerable attention of late, is reported from Ceylon as growing well, having been introduced from Java. The stems have attained in the former island the height of eight feet in three months from the time of sowing. The plant is stated to be unsuitable for cultivation at high elevations, but it is hoped that after a time it would become acclimatised to them. At the time the above was written the seeds were being distributed in several districts.

DR. SCHOMBURGK in his "Report on the Progress and Condition of the Botanic Garden and Government Plantations" of Adelaide, South Australia, for the year 1878, gives, as usual, a great deal of consideration to plants of economic interest. In the experimental ground many of the well-known British fodder grasses have been grown and produced satisfactory results. Dr. Schomburgk, however, points out the almost impossibility of stocking runs with artificial grasses on account of the large extent of pastoral land, and of the insuperable difficulty arising from climate and drought, to which some parts of the colony, especially the north, are often subjected. *Euchlæna luxurians* has not been introduced long enough to give any practical results. It is hoped, however, that the plant will turn out a great acquisition to the summer fodder plants of Australia. On the subject of flower farming for perfumery purposes there is no doubt that the Australian colonies offer special advantages for this branch of culture. Dr. Schomburgk thinks favourably of the scheme, but considers it unadvisable to manufacture the scents in the colony on account of the greater perfection with which this kind of work is done at home. As an illustration of the importance of this single use of flowers Dr. Schomburgk says:—If we consider that British India and Europe consume about 150,000 gallons of handkerchief perfume yearly, and the English revenue from Eau-de-Cologne alone is about 8,000*l.* a year; that the total revenue from imported perfumes is estimated at about 40,000*l.*, and that one great perfume distillery at Cannes in France uses yearly about 100,000 lbs. of Acacia flowers (*Acacia farnesiana*), 140,000 lbs. of rose-flower leaves, 32,000 lbs. of jasmine blossoms, 20,000 lbs. of tuberose, together with a great many other sweet herbs, we may judge of the immense quantity of material used for perfume. It is satisfactory to find that the Colonial Parliament has granted a sum of 1,000*l.* towards the erection of a new building for the Museum of Economic Botany; this sum, however, it is expected, will be supplemented by a further vote, so that a building of sufficient size, to meet the requirements of the next generation, may be erected. The design, as already furnished, is for a building in the Romanesque style, 100 feet long by 36½ feet wide. The show cases will be fixed between the windows and at right angles with them on the plan adopted in the New Museum at South Kensington. From the promises of specimens, together with those already contained in the present museum, amounting to about 2,000 objects, it is expected that the museum when finished will form a very important adjunct to the gardens. The Report concludes with a notice of the *Phylloxera vastatrix*, or vine disease, which is enlarging its borders so much as to threaten a serious visitation in Australia.

SEVERAL remarkable results have been recently obtained by Herr Kohlrausch in his researches on the electric conductivity of aqueous solutions (*Annalen der Physik*), and especially with regard to the influence of temperature on the conducting power of liquids. Thus concentrated soda-lye, which, at a temperature of − 10° conducts badly, acquires, under action of heat, a conducting power which increases regularly and with very great rapidity, so that at + 80° the liquid conducts a *hundred* times better than at − 10°. A solution of bisulphate of potash behaves quite differently; its conducting power increases very slowly with the temperature, up to a temperature of 60°, at which there is a maximum. From this point the conductivity remains nearly constant, as the temperature is raised. Studying solutions of sulphate of soda, which are known to present at 33° a remarkable peculiarity, due to the proportion, more or less, of water of crystallisation, Herr Kohlrausch found nothing peculiar in the conducting power. This seems to prove that water of crystallisation does not play any part in the conductivity of liquids for electricity.

IN addition to his astronomical paper, Admiral Mouchez is preparing the organisation, at the Observatory, of a High School of Astronomy composed of pupils from the Polytechnic and Normal Schools, and licenciés en sciences, mathematiques, et physiques. The salary of successful pupils will be 1,800 francs a year, and positions will be secured for them in the French national observatories. The school will also admit a number of free students, who will have the advantage of the use of the instruments of the observatory.

THE New York correspondent of the *Daily News* telegraphs as follows:—"Mr. Edison has obtained a dynamometer of sufficient delicacy to measure every one-hundredth of horse-power. With this instrument he can calculate the cost of the electric light to the minutest detail. He has demonstrated that from 80 to 90 per cent. of energy is converted into light, and that six electric lights are supplied from one horse-power at one-third the cost of gas. He maintains that the problem of applying the electric light to domestic use has been practically solved, but admits that a great mass of detail remains to be worked out. He has satisfied himself that platinum can be supplied in large quantities so as to reduce the expense.

THE forests of Central Nevada appear (from the accounts of Mr. Sargent, who visited the region last year, and writes about them in *Silliman's Journal* for June) to be miserably poor in extent, productiveness, and especially in number of species. Yet they are of immense value, as regulating and protecting the rare and uncertain streams on which the agriculture of Nevada depends, and furnishing a large population with fuel and lumber, a population practically cut off from outside supply. Mr. Sargent laments the wasteful destruction of forest which follows every new discovery of the precious metals in that region, both on account of the immense age of these forests, and of the impossibility of restoration; and he thinks government should check it. The central Nevada forests consist of but seven species, the juniper (*Juniperus californica*, var. Utahensis) and nut pine (*Pinus monophylla*, Torr.), being the most common. Mountain mahogany (*Cercocarpus ledifolius*) comes next, probably the only North American wood heavier than water, and furnishing the common and cheapest fuel. The other species are the red cedar, the aspen, and two of pine. A comparison which Mr. Sargent makes, of the arborescent vegetation of Nevada with that of the region lying directly east and west of the Great Basin, brings out still more clearly the remarkable poverty of the former.

A VERY ingenious application of electricity to the purposes of navigation has recently been effected by Mr. Henry A. Severn, of Herne Hill, who has succeeded in producing a mariner's compass which enables the captain or officer in charge to hear, by the ringing of a bell, when the vessel is out of the ordered course. The whole of the apparatus is contained in a small box which is easily carried about, and is intended, as a rule, to be placed in the captain's cabin. Over the card are two index hands, which can be adjusted to any angle allowing of greater or less deviation in steering to either the port or starboard side. Assuming the captain, on quitting the deck, to have given instructions to steer the ship on a certain course, he sets the index hands to a certain angle, allowing the steersman a given latitude for deviation either to port or starboard of that course. Should the ship be steered off her course beyond the limit allowed on either side an electric alarm-bell rings instantaneously and, moreover, continues ringing until the right course is resumed. The metal point on which the card is hung is insulated from the compass bowl, and to it is attached a wire from one pole of a small battery. About an inch above the card, placed parallel to its surface and attached to its metal centre (which is insulated from the needle) is an arm of metal reaching nearly to the edge of the card. This arm is, therefore, in metallic communication with the wire from the battery already referred to. The glass lid of the compass has a short brass rod working within a tube passing through it. These are severally attached to two brass milled heads above the glass lid and to the two movable index-hands beneath the glass. These are in metallic contact with the brass-work of the compass, and this with the other pole of the battery. Beneath the outer extremities of the index-hands are suspended two pieces of platinum wire about three-quarters of an inch long. These hands can, by means of the two milled heads, be moved round to any position over any point of the card. Hence they admit of being placed on either side and equally distant or otherwise from the end of the metal arm on the card. It will thus be seen that whenever the platinum wires come into contact with the metal arm on the card the circuit is completed. The electric bell being placed in the circuit sounds whenever such contact takes place. Two bells of different tone can be used, and thus the instrument will indicate to the captain whether the deviation in steering is to port or starboard.

WE have received an interesting *Jahresbericht* of the Natural History Society of Wisconsin, which is evidently largely composed of Germans, the Report being in that language.

WE have on our table the following books:—"The Human Species," A. de Quatrefages (C. Kegan Paul); "Practical Photography," Part 1, O. E. Wheeler (*Bazaar* Office); "Modern Meteorology" (Ed. Stanford); "Mechanics," Prof. R. S. Ball (Longmans); "The Application of Generalised Co-ordinates to the Kinetics of a Material System," H. W. Watson and S. H. Burbury (Clarendon Press); "Galileo Galilei," Karl von Gebler (Kegan Paul); "What is Truth," John Coutts (F. Pitmann); "Sulphuric Acid and Alkali," Vol. i., George Lunge (Van Voorst); "Elementary Arithmetic and How to Teach It," G. Ricks (Isbister and Co.); "Supplement to a Handbook of Chemical Manipulation," C. G. Williams (Van Voorst); "Town and Window Gardening," C. M. Buckton (Longmans); "Der Process Galilei's und die Jesuiten," Dr. F. H. Reusch (Edw. Weber, Bonn); "Parasites, a Treatise on the Entozoa of Man and Animals," T. Spencer Cobbold, M.D. (Churchill); "Elements of South-Indian Palæography," A. C. Burnett (Trübner); "Twenty Lessons in Inorganic Chemistry," W. G. Valentine (W. Collins); "Observed Lunar Distances," John B. Pearson (Bell and Sons); "Floral Dissections," Rev. G. Henslow (Edw. Stanford); "Contributions to our Knowledge of the Arctic Regions," Part 1 (Edw. Stanford); "Proceedings of the Aberdeenshire Agricultural Association," Sessions 1878; "A Manual of Scientific Terms," Rev. James Stormouth (Maclachlan and Stewart, Edinburgh); "Hand List of Mollusca in the Indian Museum," Part 1, Godfrey Nevill (Calcutta); "Chronological History of Plants" Charles Pickering (Trübner); "Report of New York State Survey, 1878," James F. Gardner; "Pontresina and its Neighbourhood," J. M. Ludwig (Stanford); "Description physique de la République Argentine," Vols. ii. and v., and Atlas, &c., Dr. H. Burmeister (Paris, F. Savy); "British Birds," G. Peter Moore (J. van Voorst); "A Hunting Expedition to the Transvaal," D. Fernandes das Nives (Bell); "Origin of the Laws of Nature," Sir Edw. Beckett, Bart. (S.P.C.K.); "Lectures on Practical Astronomy," Rev. J. Challis (Deighton, Bell, and Co.); "Arithmetic," J. W. Marshall (Marcus Ward); "Scientific Lectures," Sir John Lubbock (Macmillan and Co.); "Agricultural Botany, Turnip-singling," A. Stephen Wilson (Smith, Aberdeen); "The Rights of an Animal," E. B. Nicholson (Kegan Paul); "Commercial Organic Analysis," Vol. i., Alf. Allan (Churchill); "Demonology and Devil-Lore," 2 vols., M. D. Conway (Chatto and Windus); "Atlas of Histology," Part 5, Smith and Klein (Smith, Elder).

THE additions to the Zoological Society's Gardens during the past week include a Crested Pigeon (*Ocyphaps lophotes*) from Australia, presented by the Rev. A. H. Glennie; two Lesser Redpoles (*Linota linaria*), British, presented by Dr. Bree, F.Z.S.; a Common Lobster (*Homarus vulgaris*), British Seas, presented by Mr. G. H. Jones, F.Z.S.; two Black-tailed Godwits (*Limosa melanura*), British, two Beautiful Parrakeets (*Psephotus pulcherrimus*) from Australia, four White Storks (*Ciconia alba*), European, two Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, purchased; two Geoffroy's Doves (*Peristera geoffroii*), three Spotted-billed Ducks (*Anas pœcilorhyncha*), three Australian Wild Ducks (*Anas superciliosa*), three Chilian Pintails (*Dafila spinicauda*), bred in the Gardens.